

DL Report

Question 3

The data is divided by an 80-20 split into train and val

[Here](#) is the link for all the weights along with the best weights.

(1) Report Average precision (AP) and confusion matrix over the given dataset(validation set) using the pre-trained model(without finetuning). [15 marks]

mAP on val with the pretrained weights.

```
506/506
mAP:
bird: 0.0
bobcat: 0.011557311096481603
car: 0.4445338715265824
cat: 0.007590241576459477
raccoon: 0.05251340699101893
rabbit: 0.03546910755148741
coyote: 0.005090281855549031
squirrel: 0.0
{0: (0.0, 42.0), 1: (0.011557311096481603, 69.0), 2: (0.4445338715265824, 48.0), 3: (0.007590241576459477, 87.0), 4: (0.05251340699101893, 134.0), 5: (0.03546910755148741, 46.0), 6: (0.005090281855549031, 40.0), 7: (0.0, 56.0)}
```

Confusion matrix

```
[[ 0  5  0  1  0  0  1  0  0]
 [ 0  2  0  0 30  0  0  0  0]
 [ 0  0  3  0 70 20  0 20  0]
 [ 0  1  0  0  0  0  0  0  0]
 [ 0  0  0  0  0  0  0  0  0]
 [ 0  0  1  1  0  0  0  0  0]
 [ 0  0  2  0  0  0  0  0  0]
 [39 31 42 85 54 26 39 26  0]]
```

(2) Report AP and confusion matrix on the given data using the fine-tuned model. Also, report the classwise performance and analyse your findings. [15 marks]

```
mAP:
bird: 0.35704848608626516
bobcat: 0.8061076775973426
car: 0.9991666666666666
```

```
cat: 0.7027134110682781
raccoon: 0.84946951411563
rabbit: 0.6744595436198793
coyote: 0.6702192806002311
squirrel: 0.5649288250642047
Avg mAP 0.7030141756023123
Best loss: 0.236242781216085 Best mAP: 0.7030141756023123
```

Analysis: car, cat and bird are present in the coco dataset as well as the given camera traps dataset. So it was easier for us to converge on these classes. However, as enough training samples aren't there in bird, so it was difficult to converge on it.

Confusion matrix

```
[[ 7  0  0  0  0  1  0  0  0]
 [ 0 31  0  1  2  0  1  0  1]
 [ 0  0 72  0  0  0  0  0  0]
 [ 0  1  0 32  0  1  0  1  0]
 [ 0  0  0  5 69  1  1  0  0]
 [ 5  0  0  0  0 41  1  1  0]
 [ 2 10  0  8  1  0 22  1  1]
 [ 0  0  0  0  1  0  0 52  1]]
```

(3) Add the loss plots for convergence obtained while training. Justify the choice of the preprocessing and hyperparameters, if any. Also, submit the weights of your best model. [15 marks]

We did a 80-20 Train-Val split for the given dataset.

The learning rate is $1e5$ as on higher learning rates we were getting a lot of variation.

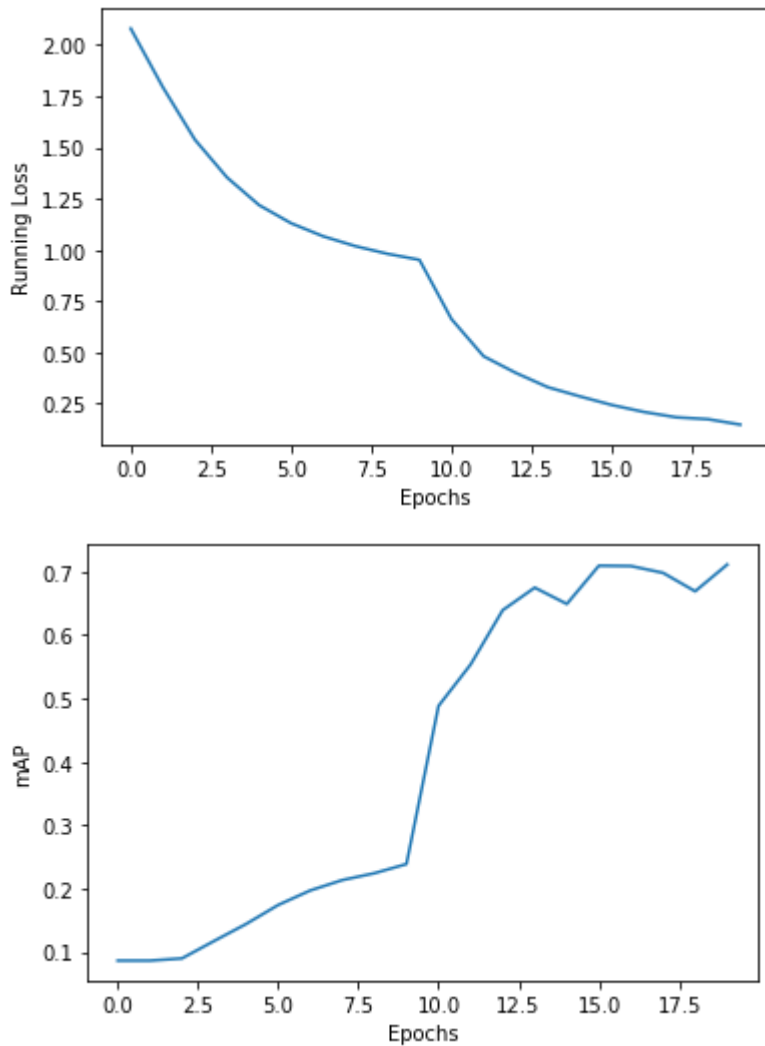
Using adam optimizer as it was giving better results than others.

For preprocessing we have used `Normalizer()` to normalize the data. Here we are subtracting from mean and dividing by standard deviation.

`Resizer()` to resize the image to match the input given (same aspect ratio)

Finally we used `Augmenter()` to horizontally flip the images. This will help in making a more general model

All these functions have been taken from `dataloader.py`



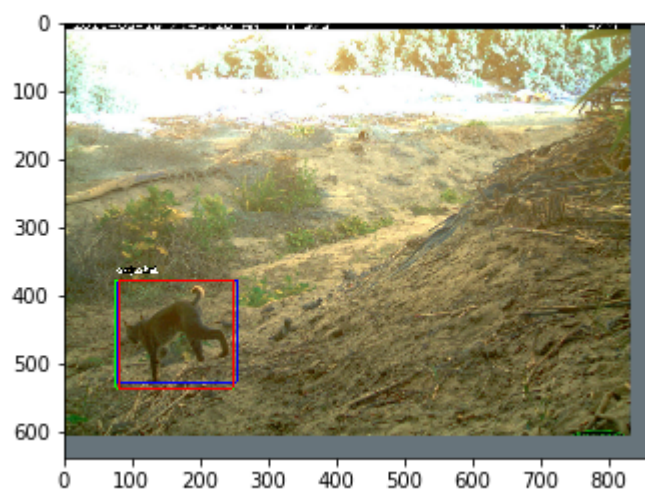
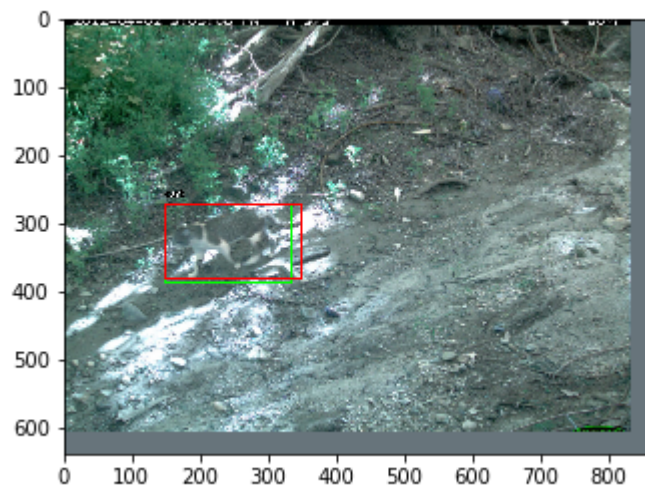
(4) For each class present in the given data, show random examples of images (3 from each class) along with the ground truth bounding box, bbox predictions using the finetuned model as well as the pre-trained model. Compare. [30 marks] Color code: Ground Truth: red Normal model: blue Finetuned model: green

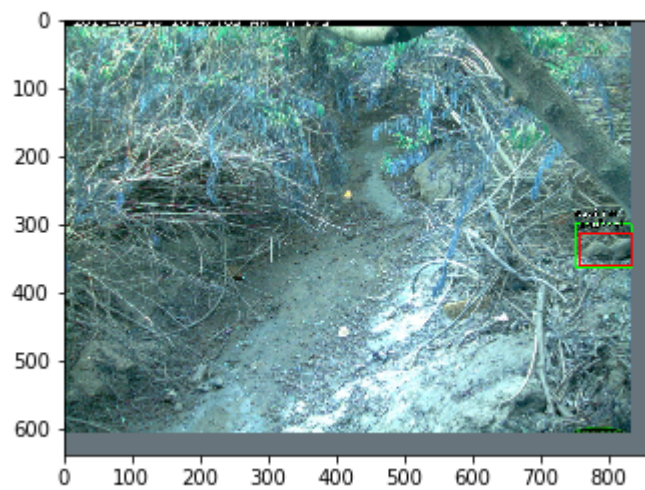
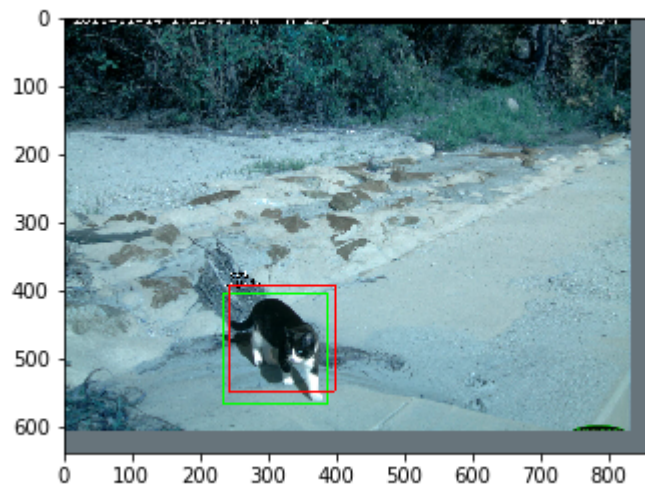
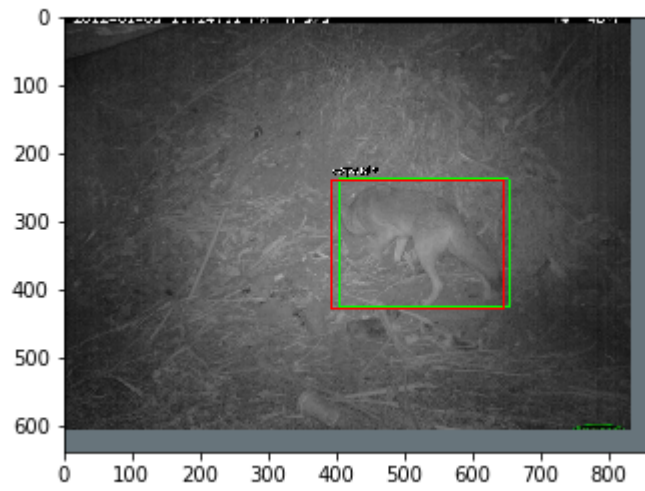
```

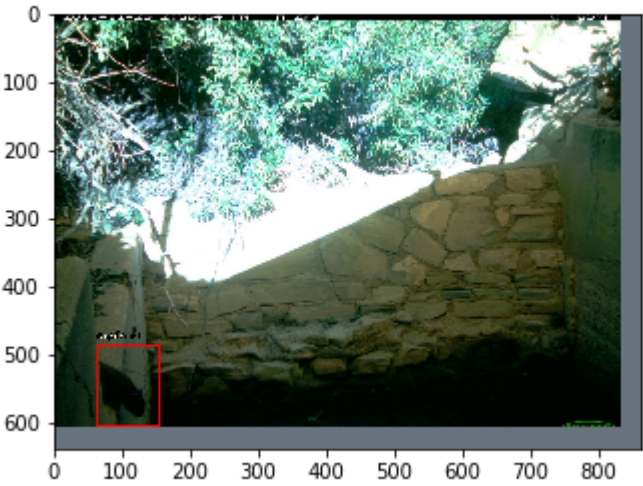
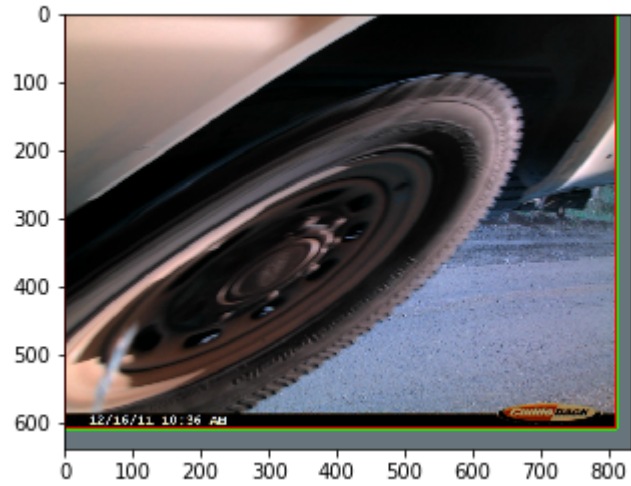
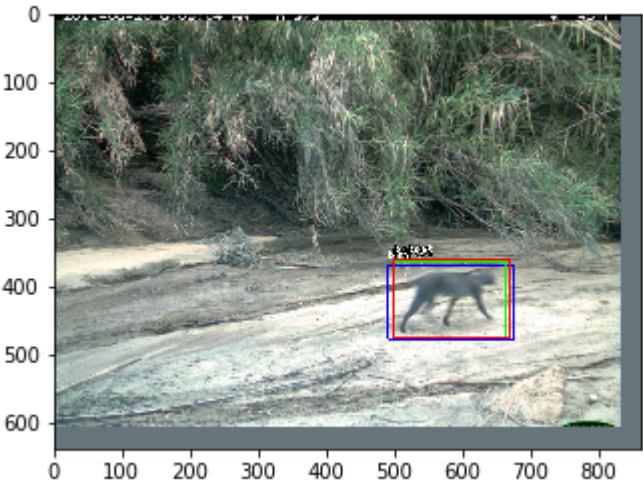
1 Finetuned model: cat
1 Ground truth: cat
-----
2 Ground truth: raccoon
-----
3 Model: cat
3 Finetuned model: coyote
3 Ground truth: bobcat
-----
4 Finetuned model: coyote
4 Ground truth: coyote
-----
5 Finetuned model: coyote
5 Ground truth: cat
-----
6 Finetuned model: squirrel
6 Ground truth: squirrel
-----
7 Model: bird

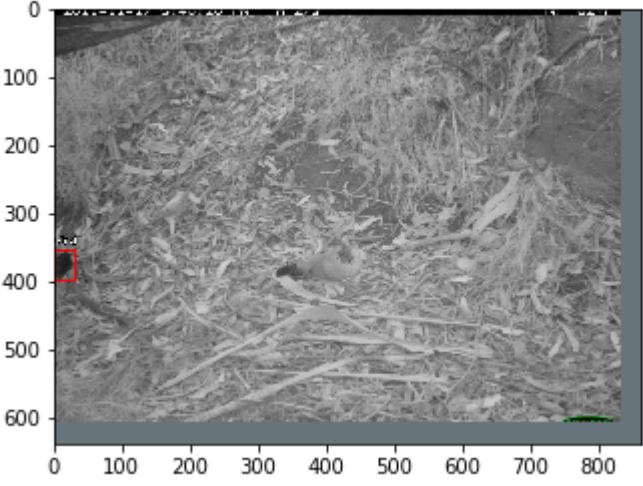
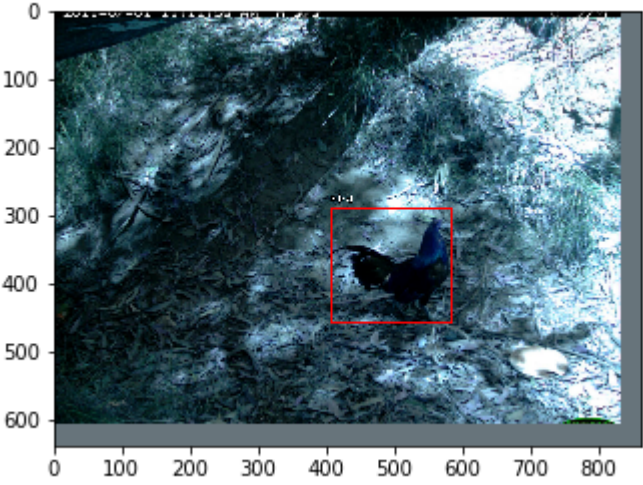
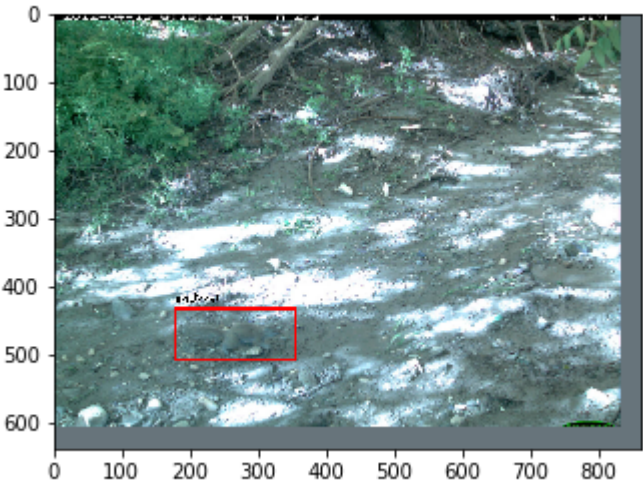
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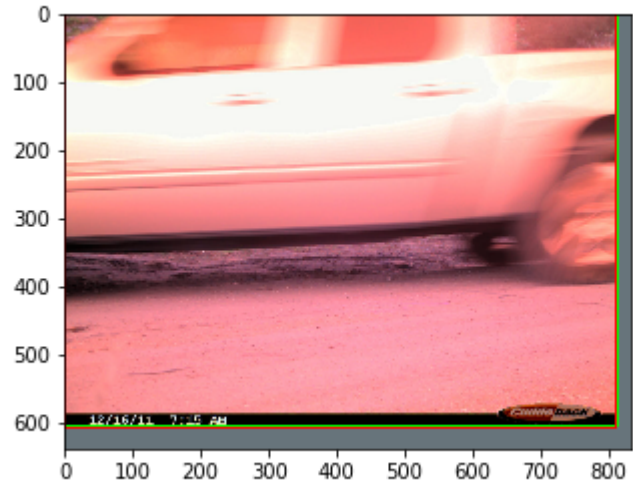
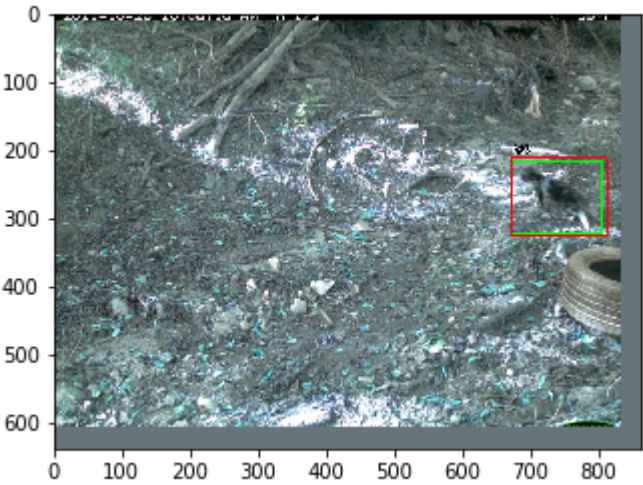
```
7 Finetuned model: bobcat
7 Ground truth: bobcat
-----
8 Finetuned model: car
8 Ground truth: car
-----
9 Ground truth: squirrel
-----
10 Ground truth: squirrel
-----
11 Ground truth: bird
-----
12 Ground truth: bird
-----
13 Finetuned model: cat
13 Ground truth: cat
-----
14 Finetuned model: bobcat
14 Ground truth: bobcat
-----
15 Finetuned model: car
15 Ground truth: car
-----
16 Ground truth: rabbit
-----
17 Ground truth: bird
-----
18 Finetuned model: raccoon
18 Ground truth: raccoon
-----
19 Finetuned model: car
19 Ground truth: car
-----
20 Finetuned model: raccoon
20 Ground truth: raccoon
-----
21 Finetuned model: coyote
21 Ground truth: coyote
-----
22 Finetuned model: rabbit
22 Ground truth: rabbit
-----
23 Ground truth: rabbit
-----
24 Ground truth: coyote
-----
```

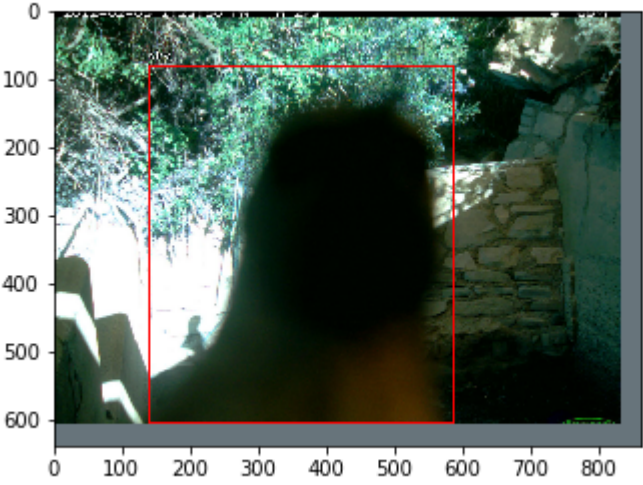


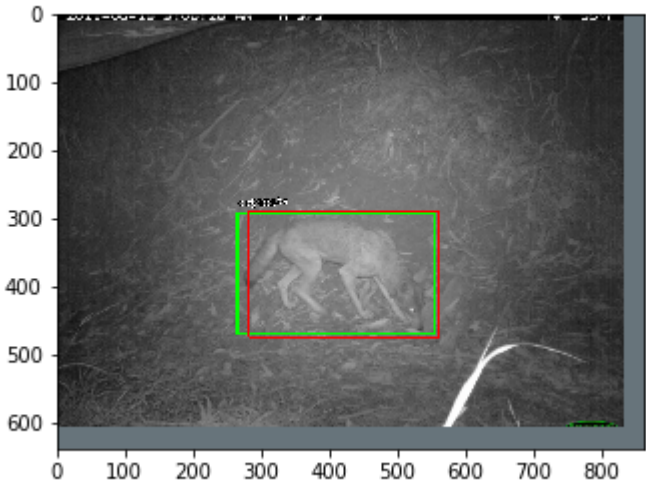
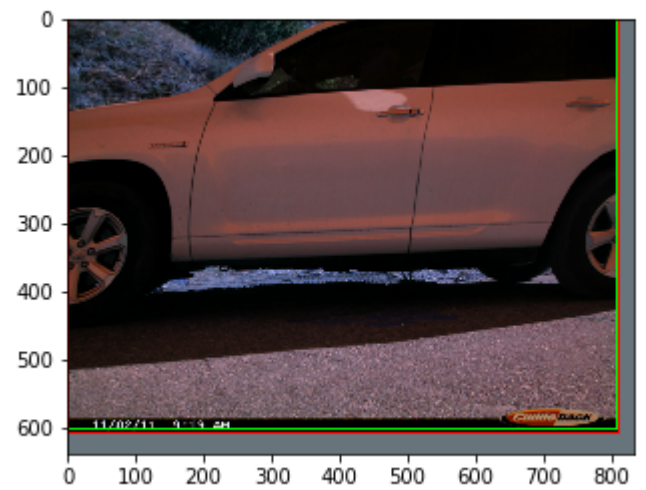


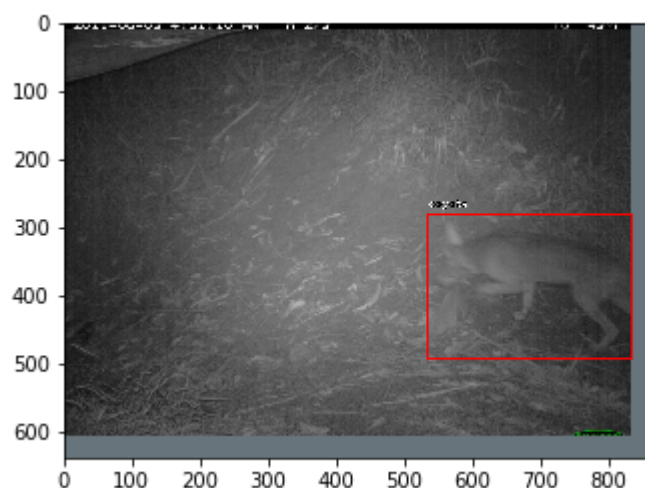
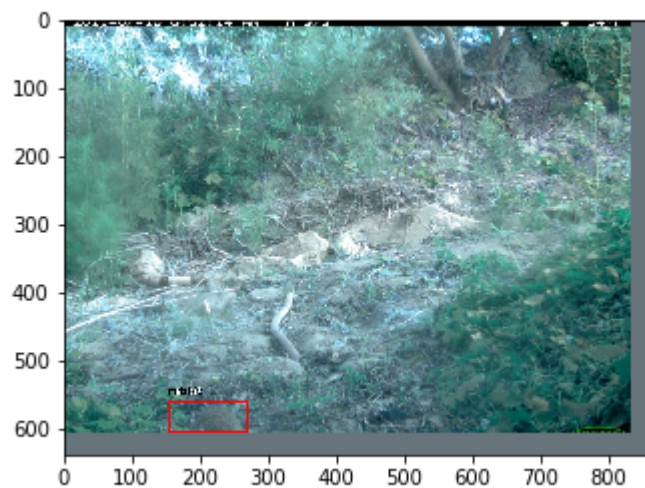
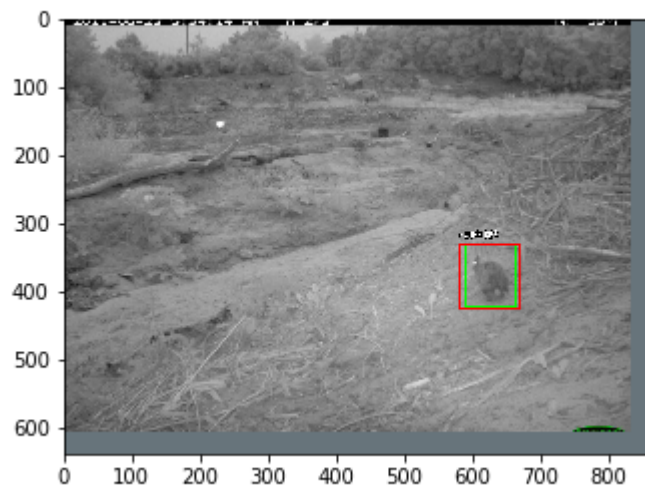












(5) Write a script to report Average Precision (AP) obtained from the fine-tuned model over the unseen test data (to be released during demo). The format for the test data will be the same as that of the given data, with separate folders for classwise images and an annotation file (.json extension). [35 marks as per the accuracy]

The name of the script is q3-train.py